



Spectral Gamma-Ray Borehole  
Log Data Report

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Borehole

21-01-02

Log Event A

### Borehole Information

Farm : <u>BX</u>	Tank : <u>BX-101</u>	Site Number : <u>299-E33-135</u>
N-Coord : <u>45,410</u>	W-Coord : <u>53,185</u>	TOC Elevation : <u>656.40</u>
Water Level, ft :	Date Drilled : <u>5/31/1970</u>	

### Casing Record

Type : <u>Steel-welded</u>	Thickness : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>100</u>	

### Borehole Notes:

According to the driller's log, this borehole was drilled in May 1970 to a depth of 100 ft using 6-in. casing. The drilling report does not indicate the borehole casing was perforated or grouted. The casing thickness is presumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. steel tubing. The top of the casing, which is the zero reference for the SGLS, is approximately 0.5 ft below the ground surface.

### Equipment Information

Logging System : <u>1B</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>02/1997</u>	Calibration Reference : <u>GJO-HAN-13</u>	Logging Procedure : <u>P-GJPO-1783</u>

### Log Run Information

Log Run Number : <u>1</u>	Log Run Date : <u>05/08/1997</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>0.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>21.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>
Log Run Number : <u>2</u>	Log Run Date : <u>05/09/1997</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>98.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>30.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>
Log Run Number : <u>3</u>	Log Run Date : <u>05/12/1997</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>31.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>20.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>



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## Analysis Information

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Analyst : S.D. Barry

Data Processing Reference : MAC-VZCP 1.7.9

Analysis Date : 07/08/1997

### Analysis Notes :

This borehole was logged by the SGLS in three log runs. The pre- and post-survey field verification spectra met the acceptance criteria established for the peak shape and detector efficiency, confirming that the SGLS was operating within specifications. The energy calibration and peak-shape calibration from these spectra were used to establish the channel-to-energy parameters used in processing the spectra acquired during the logging operation.

Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis.

The man-made radionuclides Cs-137, Co-60, Eu-154, and processed uranium were detected around this borehole. The presence of Cs-137 was measured continuously from the ground surface to a depth of 10.5 ft. Alternating zones of intermittent and continuous Cs-137 contamination were detected from 10.5 ft to the bottom of the logged interval (98 ft). The presence of Co-60 was detected continuously from 56 to 78 ft. Alternating zones of intermittent and continuous processed uranium were detected from 79 to 92.5 ft. The presence of Eu-154 was detected from 60.5 to 61.5 ft.

The K-40 concentration values increase at 37 ft. It was not possible to identify many of the 609-keV peaks used to derive the U-238 concentrations between about 7 and 11 ft. This occurred because high gamma-ray activity associated with the nearby Cs-137 peak (661 keV) created an elevated Compton continuum extending to the 609-keV region, causing the MDL to exceed the measured U-238 concentration.

An analysis of the shape factors associated with applicable segments of the spectra was performed. The shape factors provide insights into the distribution of the Cs-137 and Co-60 contamination and into the nature of zones of elevated total count gamma-ray activity not attributable to gamma-emitting radionuclides.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Reports for tanks BX-101 and BX-102.

### Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations.

Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.



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Plots of the spectrum shape factors are also included. The plots are used as an interpretive tool to help determine the radial distribution of man-made contaminants around the borehole. A historical gross gamma-ray data plot and a historical decay data plot are also included.